

GROSS, S.A.

Increasing the economic efficiency of the operation of
centrifugal pumps in the transportation of highly viscous
oils and mazuts through petroleum. Neft. khoz. 42 no.1:
57-63 Ja'64. (MIRA 17:5)

GROSS, S.A.; SAKHENIKOV, A.S.; SEMENOV, V.S.; SLEPACHIN, S.F.; SHURYGIN, I.G.

Some results of the acceleration of filling and discharge operations
on the Tuapse tank farm. Transp. i khran. nefti i nefteprod. no.9:2-30
'64. (MIRA17:10)

1. Krasnodarskiy politekhnicheskiy institut i Tuapsinskaya pereval-
chnaya neftebaza.

GROSS, S.A.

Condition of constant output of a series of operating pumping
stations in transporting petroleum of varying viscosity. Izv.
vys. ucheb. zav.; neft' i gaz. 7 no.10:93-98 '64.

(MIRA 18:2)

1. Krasnodarskiy politekhnicheskiy institut.

GROSS, V., prof. inv.

Shall we soon have the equipment for ... factories?
Stavivo 42 no.12:159 3 164.

1. Higher School of Technology, Brno.

GROSS, V.D., tekhnik

Conversion of the FV-6L-4 phase regulator. Energetik 11 no.10:
37 0 '63. (MIRA 16:11)

GROSS, Vladimir, prof., inz.

"Catalog of automation means". Reviewed by Vladimir Gross. Inz
stavby 10 no.12:Suppl.:Mechanizace no.12:147 '62.

GROSS, Waldemar (Poland)

Some words about the Jezow Sudecki gliding airfield and some questions relating to wave flight. Repules 14 no.1:6-7 Ja '62.

1. Lengyel Helykoztarsasag Aeroklubjanak iskolavezetoje.

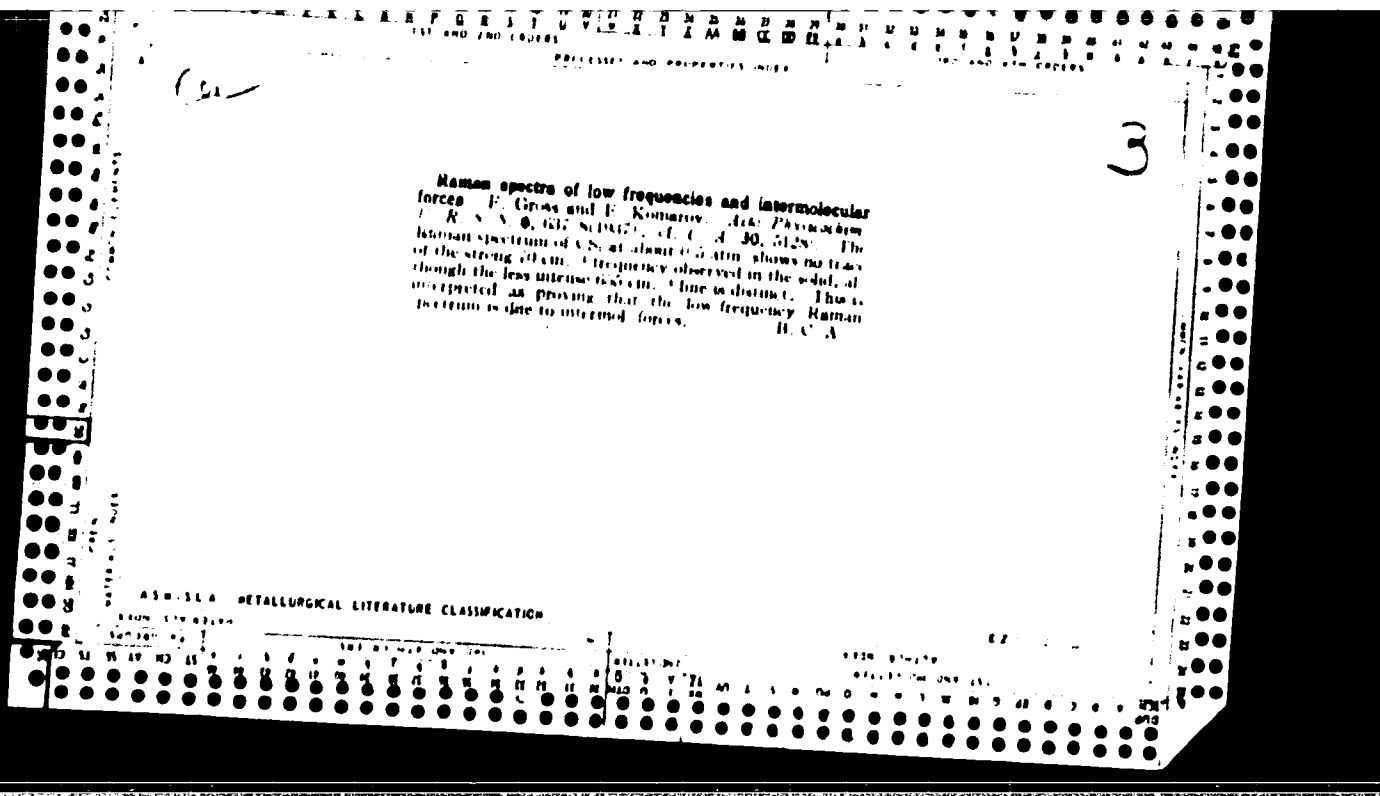
C. A. Gross, Jr. F.

3

Raman spectra of amorphous substances. E. L. Aliev and M. P. Vukh. *Compt. rend. acad. sci. U. R. S. S. I.* 214-18 (in German) 216 17 (1955).-- Raman spectra of amorphous B_2H_6 , $NaBH_4$, $LiBH_4$ and LiH_2 and of glassy Na_2SO_4 were photographed. B_2H_6 shows a sharp intense line at 810 cm^{-1} and weak lines at 1130 and 1255 cm^{-1} . The sharpness of the lines is unusual for amorphous substances and is attributed to the mod. structure of B_2H_6 . Boron has an intense band at 760 cm^{-1} and weaker bands in the regions 430-535, 950-1000, 1077-1127 and 1310-1520 cm^{-1} . The phosphoric acids have diffuse bands around 600, 1005, 1120 and 1270 cm^{-1} . Na_2SO_4 glass shows similar diffuse lines which do not alter when the glass is heated to 530°.

E. I. Rosenbaum

K. I. Koenigs



Polarization of low-frequency scattering lines by crystals. E. Gross and M. Vukobratovic. *J. Exp. Theor. Phys.* (U.S.S.R.), 1961 6:1938. *Acta Physicochim. U.R.S.S.* 36, 200 (1968). For diphenyl ether and dibenzo benzene the coeff. of depolarization varies from $\rho_p = 0$ to ρ_p is greater than 1. *p*-Dibenzodisulfone shows anomalous polarization when ρ is much greater than 1.

F. H. Rathmann

State Optical Inst.

PROCESSING AND PROPERTY DATA																									
TITLE AND TOPIC													SUBJECTS												
<p>Splitting of the Rayleigh line and the acoustic spectrum of crystals. E. Gross. <i>Compt. rend. acad. sci. P. R. S. S. 18, (4) 4, (1936) (in English)</i>. In the scattering of light by liquids the appearance of 2 modified lines in addn. to the original line is due, according to theory, to Debye's longitudinal heat waves. G. extends this to crystals. Here there are 1 longitudinal and 2 transverse waves which should result in the appearance of the 6 modified lines observed experimentally. Amorphous solids have, in addn. to the longitudinal wave, only 1 transverse wave, and 4 modified lines are to be expected but, because of optl. difficulties, have not yet been observed. E. G. W.</p>																									
<p>ASAC SLA METALLOGICAL LITERATURE CLASSIFICATION</p>																									
<p>CLASSIFICATION</p>																									

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PROCESSING AND PREPARATION

The nature of the low-frequency Raman spectrum and the spectrum of the hexamethylbenzene crystal. E. I. Gips and A. I. Raskin. *Compt. rend. acad. sci. U. R. S. S.* 24, 125-8, (1939) (in English). In the Raman spectrum of a single crystal of C_6Me_6 2 bands were found at frequencies of 53 and 95 cm^{-1} . The existence of these bands supports the conclusion of Gross and Vuks (*C. A.* 30, 6128) that the low-frequency Raman spectrum results from intermol. oscillations of the crystal lattice.

T. H. Dunkelberger

Phys. Inst, Leningrad State U.

450-15.6 METALLURGICAL LITERATURE CLASSIFICATION

Low-frequency scattering spectra in p -, m - and o -diiodobenzene... by E. Gross and A. V. Korshunov (Comp. rend. acad. sci. U. S. S. R. 24, 1328-31 (1969) in English). The new type of scattering spectrum observed in crystals of org. substances is probably due to the intermol. vibrations, translational and angular, within the cryst. lattice. A true test of the theory seems possible only by the comparison of the spectra of substances having the same structure but contg. different isotopes but an approach to the solution of the problem is made with p -, l -, m - (II) and o - (III) $\text{C}_6\text{H}_5\text{I}_2$, which have the same mass but different structures and consequently different moments of inertia. The cryst. lattices of I and II are known to be closely related, that of III, less completely known, obtained with monocrystals at room temp. with the ultraviolet portion of the spectrum absorbed by 10% NaNO_3 in H_2O are: I 15, 25, 115; II 24, 70, 101; III 23, 46, 74, 80, 100, 127. The agreement in the frequencies for the 3 compounds is explained as due to the fact that all 3 have the same mass, i. e., they are the translational vibrations of the whole mol. in the crystal lattice. The noncoincidence of the other lines should then possibly be put down to the angular vibrations of the whole mol.

Janet E. Austin

Phys. Inst., Leningrad State U.

ASB-334 METALLURGICAL LITERATURE CLASSIFICATION

GROSS, YE. F.

"The Low-Frequency Scattering Spectrum in Hexamethyl-benzene Crystals," Is. Ak. Nauk SSSR, Ser. Fiz., Vol. 4, No. 1, 1940.

CA

PROCESSED AND PRIORITIZED INDEX

No. 4

Electronic Raman effect. *Silva-Gama, A. L., Raskin and A. Seidel. Acta Physicochim. U. R. S. S. 13, 591-4 (1940). (in English).--* The supposed electronic Raman effect found by Silaiya and Venkataramiah (C. A. 33, 7664) in $\text{Sn}(\text{NO}_3)_2$ solns. is ascribed to a misinterpretation of the photographs obtained, which in fact show only the absorption spectrum of $\text{Sn}(\text{NO}_3)_2$ on the continuous emission Hg spectrum as background. No satisfactory evidence for an electronic Raman effect has been brought forth as yet.

F. H. Rathmann

ASAC-SLA METALLURGICAL LITERATURE CLASSIFICATION

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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No. 8

Debye's transverse heat waves and the scattering of light in crystals. ✓
 E. Guzan (*Compt. rend. Acad. Sci. U.R.S.S.*, 1960, 20/787-790). --
 The existence of six components of the Rayleigh line in crystals
 (cf. A., 1958, 1, 178) is discussed. Their origin may be explained
 by supposing that the two displaced components are due to Debye's
 longitudinal heat waves and the four additional components are
 due to light scattered from two transverse heat waves of the acoustic
 spectrum of the crystal. This view is confirmed by the determination
 of the shifts of λ in the displaced components in quartz. The
 velocities of propagation of the longitudinal and transverse heat
 waves can be obtained from these displacements the results being
 6400 m. per sec. for the longitudinal λ , and 3000 and 2800 m. per
 sec. for the two transverse waves. These values are in good agree-
 ment with those obtained from the known velocities of propagation
 of longitudinal and transverse waves along the direction of the crystal
 which would be taken by the elastic waves scattering the light,
 calc. from the torsion or data. The results are also in agreement
 with the amount of light scattered by crystals, and are confirmed
 by the work of Michailov on the diffraction of light at high-frequency
 transverse elastic waves in cubic crystals (see following abstract).
 A. J. M.

Spectra of scattered light and viscosity of liquids. E. F. Gross and
A. A. Siromiatnikov (*Bull. Acad. Sci. U.R.S.S., Ser. Phys.*, 1961, B,
144-147). - The intensity of light depolarised and scattered without
frequency change is high in ThOCl_3 and $\text{P}_2\text{O}_{10}^{4-}$ at 19° . At
 $140-170^\circ$ this intensity is less, but a diffuse depolarised back
ground appears on both sides of the unchanged frequency. The
background is due to mol. movement and becomes noticeable when
the relaxation time of a mol. is comparable with the period of light
vibrations. J. J. H.

Structure of the Rayleigh line and the viscosity of liquids. E. Gross and A. Siromiatnikov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **22**, 219-221).—Measurements of the spectra of scattering of β -creosol (B) and of PhOH at room temp. and at 140° for (B) and 74° for PhOH confirm the view, derived from theoretical considerations, that in viscous liquids the intensity of the depolarised undispersed component of the Rayleigh line is connected with the depolarised background observed near the components of the triplet. On heating (B) or PhOH η decreases markedly, the undispersed line decreases in intensity, and a strong depolarised continuous background appears in its neighbourhood. L. S. 1

Rotation of molecules in the crystal lattice and light scattering.
E. Gyron and A. Koshin (*Acta Physicochim. U.R.S.S.*, 1942, 17, 127-134).—Some crystals exhibit anomalies in sp. heat, dielectric const., etc. in the temp. region immediately below the m.p. This behaviour is generally accompanied by an enantiotropic transition to a higher-temp. form with greater symmetry. Such crystals are intermediate between true crystals and liquids and hence are called "quasi-liquid crystals". The diffusion spectra of some examples of such substances ($C_{12}H_{10}$, cyclohexanol, camphor, borneol, camphene (B), and $C_{10}H_8$) were examined around the Rayleigh line at temp. between the transition temp. and the m.p.; the low- ω diffusion spectra of the liquids were also examined. Some of the crystals examined showed any low- ω lines of noticeable intensity away from the Rayleigh line. The results do not enable a choice to be made between the Pauling-Powles theory of complete rotation and the Frenkel theory of "orientation fusion" for such substances. [F. 11]

Also in *ZHUR. EKSPER. i Teoret. Fiz.*, 12, No. 10, 1942

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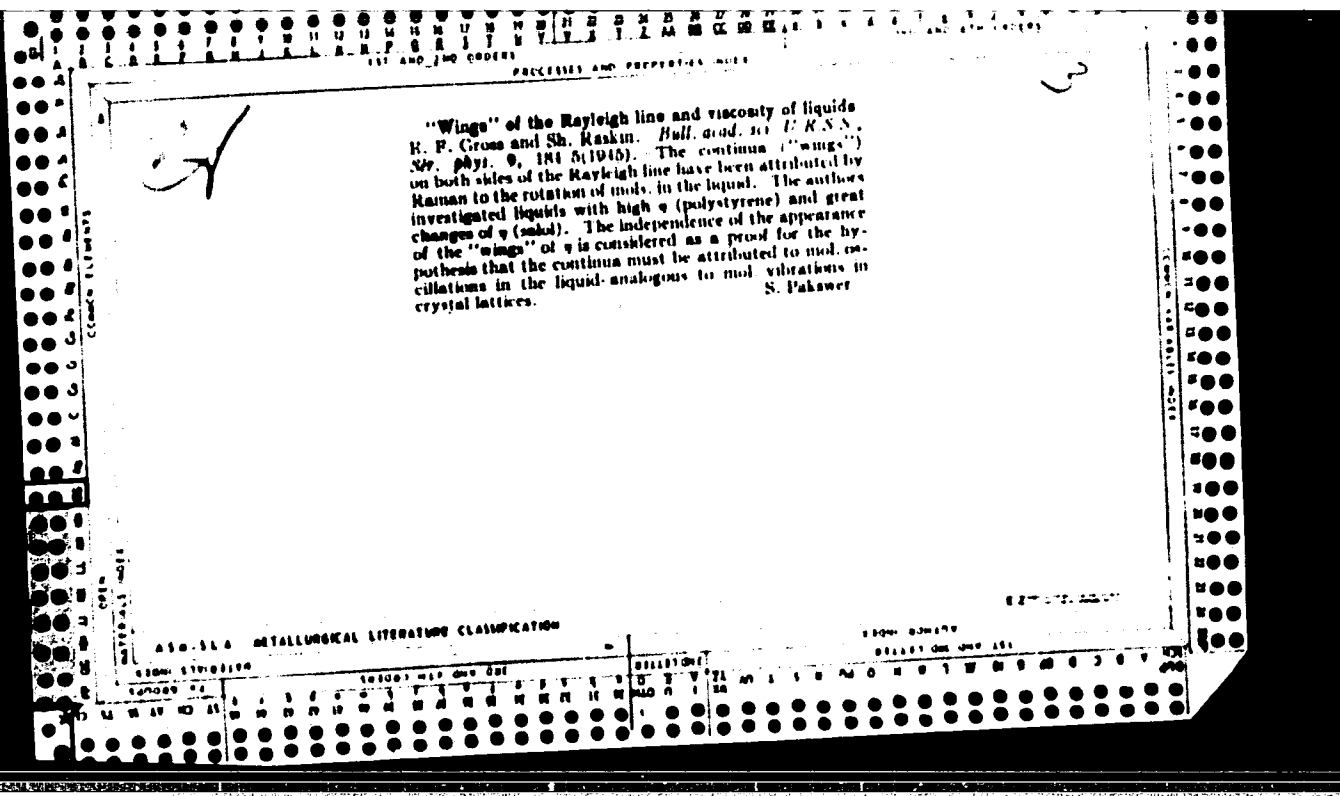
3

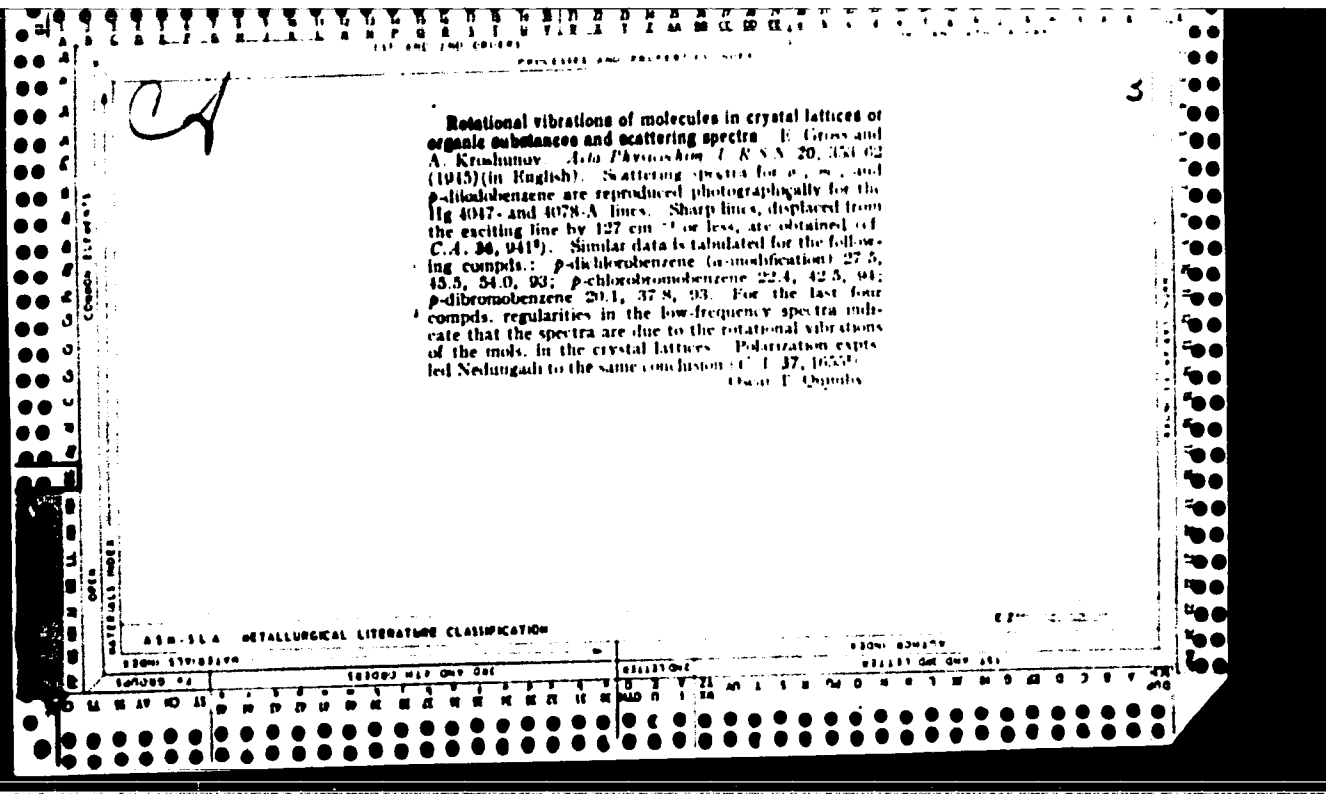
Infrared vibrations of certain organic crystals in the range of wave lengths of about one millimeter. E. F. Gross, A. I. Raskin and V. Volkov. *Acta Physicochim. U. R. S. S.* 18, 430 (1944) (English); *J. Exptl. Theoret. Phys.* (U. S. S. R.) 13, 229 (1944). The low-frequency scattering spectrum of diphenylamine single crystals illuminated by the light from a Hg vapor lamp shows the frequencies 8, 39, 55, 80 and 144 cm. E. H. Kammann

ASAC-11A METALLURGICAL LITERATURE CLASSIFICATION

80000 810000 820000 830000 840000 850000 860000 870000 880000 890000 900000 910000 920000 930000 940000 950000 960000 970000 980000 990000

100000 110000 120000 130000 140000 150000 160000 170000 180000 190000 200000 210000 220000 230000 240000 250000 260000 270000 280000 290000 300000 310000 320000 330000 340000 350000 360000 370000 380000 390000 400000 410000 420000 430000 440000 450000 460000 470000 480000 490000 500000 510000 520000 530000 540000 550000 560000 570000 580000 590000 600000 610000 620000 630000 640000 650000 660000 670000 680000 690000 700000 710000 720000 730000 740000 750000 760000 770000 780000 790000 800000 810000 820000 830000 840000 850000 860000 870000 880000 890000 900000 910000 920000 930000 940000 950000 960000 970000 980000 990000





GROSS, E. F.

Jul/Aug 1947

USSR/Physics

Spectroscopy

Crystals - Structure

"Born's Theory and the Dispersion Spectrum of Alkaline Haloid Crystals," E. F. Gross, A. I. Stekhanov, 3 pp

"Iz Ak Nauk, Ser Fiz" Vol XI, No 4

The simple structure of alkaline haloids facilitates the theoretical calculation of the spectrum of elastic fluctuation. The authors used KCl, KBr, and rock salt in their experiments, to try to explain the presence of a complex background in Raman's spectrum of the second order. Comments by several scientists of FIAN. Submitted at the Physics and Technical Institute, Academy of Sciences of the USSR.

28r90

PROCESSES AND PROPERTIES INDEX

3

Temperature variation of the second-order Raman spectrum of crystals. K. Gross and A. Stehanov (Acad. Sci. U.S.S.R., Leningrad). *Nature* 160, 568-9(1947).

The second-order scattering of NaCl crystals shows a much greater dependence on temp. for the region of small than of the large frequencies. The spectrograms were taken at 250 and 700°. The decrease between frequencies from 00 up to 200 cm⁻¹ of the continuous spectrum is scarcely noticeable for 700° against that at 250°. The anti-Stokes lines of the first order of the Raman spectrum are more sensitive to temp. than the Stokes lines. The difference lines of the second order of the anti-Stokes lines are more dependent on temp. than those of first order, because the excited state of the lattice enters into the exponential factor. The results are in good agreement with unpublished calcs. These expts confirm Born's theory of the crystal lattice.

O. Brill

A5D-SLA METALLURGICAL LITERATURE CLASSIFICATION

SEARCHED _____ SERIALIZED _____ FILED _____

APR 1948

U.S. DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS

USSR/Physics

Crystals

Mathematics, Applied

Nov/Dec 48

"Dependence of Spectra of Diffused Light in Crystals on Temperature," Ye. F. Gross, P. P. Pavinskiy, A. I. Stekhanov, Physico-tech Inst, Acad Sci USSR, Chair of Theoretical Phys, Leningrad State U, 13 pp

"Iz Ak Nauk SSSR, Ser Fiz" Vol XII, No 6

After theoretical mathematical analysis of this dependence, concludes that for increase in temperature the curve of intensity distribution of the spectrum of the second rock salt series must decrease without changing shape, and increase in intensity for the entire curve must occur approximately in proportion to the square of the absolute temperature.

FA 25/49T101

25/49T101

PA 3/50193

USSR/Physics - Hydrogen Bond
Spectrum

1 Aug 49

"Vibrations of the Hydrogen Bond and the Dispersion Spectrum," Ye. P. Gross, Corr Mem, Acad Sci USSR, V. I. Val'kev, Phys Inst, Leningrad State Univ, A. A. Zhdanov, 4 pp

"Dok Ak Nauk SSSR" Vol LXVII, No 4

Disagrees with generally accepted explanation that bands of water (and other substances) situated in the low-frequency region of the dispersion spectrum are caused by intramolecular vibrations of water molecules. It is usually supposed that the band

3/50193

USSR/Physics - Hydrogen Bond
(Contd)

1 Aug 49

having an intensity maximum around 175 cm^{-1} is due to a translation intramolecular vibration and the band with maximums around 500 and 750 cm^{-1} is due to rotation vibration of the water molecules. Since about seven other substances including heavy water, formic acid, methyl and ethyl alcohol, and benzoic acid have similar maximums, and since Ansel'm and Porfir'yeva showed that a mixed translation-rotation vibration occurs in the molecular lattice, the above-mentioned explanation is not convincing. Submitted 4 Jun 49.

3/50193

USSR, IE. F.

FA 2/50T102

USSR/Physics - Crystals, Rock Salt Sep 49
Polarization

"Polarization of the Spectrum of Second-Order
Dispersion of a Rock Salt Crystal," Ye. F. Gross,
Corr Mem, Acad Sci USSR, P. P. Pavlovskiy, A. I.
Stel'manov, Leningrad Physicotech Inst, Acad Sci
USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LXVIII, No 1

Used a quartz spectrograph and a powerful water-
cooled mercury-arc lamp to study subject spectrum.
Mercury resonance line of 2,537 Å was used for
excitation. Placed rock salt crystals in special

2/50T102

USSR/Physics - Crystals, Rock Salt Sep 49
Polarization (Contd)

quartz containers, heated to 700° and illuminated
by an unpolarized source light. Light diffused
by rock salt crystal was collected by a fluorite
lens and passed through an Iceland spar crystal
set in front of the spectrograph slit. Results
of polarization studies of reflective diffusion
spectrum of rock salt at high temperatures showed
that most polarized part of spectrum is that of
low frequencies from 60 to 200 cm⁻¹. Submitted
4 Jul 49.

2/50T102

USSR/Physics - Hydrogen Bond

21 Oct 49

"The 'Wings' of the Rayleigh line and the Hydrogen Bond," Ye. F. Gross, Corr Mem, Acad Sci USSR, V. I. Val'kov, Phys Inst, Leningrad State U Imeni A. A. Zhdanov

"Dok Ak Nauk SSSR" Vol LXVIII, No 6, pp 1013-1016

Support of thesis that only external parts of "wings," removed from Rayleigh line by approx 100-250 cm⁻¹, are caused by hydrogen bond. Those parts of "wings" closer to Rayleigh line and around it should be related to oscillations of whole mol

USSR/Physics - Hydrogen Bond (Contd)

21 Oct 49

relative to each other under total influence of all Van der Waal forces acting upon mol of the liquid. Submitted 4 Aug 49.

172178

GROSS, E.F.

Raman spectrum and the polymerization process of isobutylene. B. P. Gross and K. V. Nelson, *Vestnik Leningrad. Univ.* 1950, No. 3, 64; cf. C.A. 45, 41374; 46, 2402a. —The Raman spectra were examined of the isobutylene dimer, trimer, tetramer, pentamer, and polymer (av. mol. wt. 800). The dimer has the frequencies (in cm^{-1}) of 1100, 1401, 1641, 1668, and 3070; the trimer of 1103, 1408, 1636, 1652, 1671, and 3087; the tetramer of 1110, 1408, 1637, 1650, and 3078; the pentamer of 1105, 1410, 1640, 1649, 3070, and 3085; and the polymer of 1102, 1637, 1650, 3071, and 3088. From analysis of the frequencies it was concluded that in the dimer and the trimer the double bond, C=C, is located at the ends and in the middle of the mol. In the trimer, pentamer, and polymer the double bond is found preferentially at the ends of the chain. Further polymerization is favored by location of the C=C at the ends of the mols. R. D. Kross.

CA

Low-frequency Raman spectra of crystals of the dihalobenzenes. B. P. Gross, A. V. Kirshunov, and V. A. Fel'din (Leningrad State Univ.). *Zhur. Eksp. Teor. Fiz.* 20, 202-4 (1960).—In solid *p*-C₆H₄Cl₂, *p*-C₆H₄Br₂, *p*-C₆H₄Cl, and *p*-C₆H₄I₂, ω^2 (square of the corresponding low-frequency Raman vibrations) is inversely proportional to the mol. moment of inertia; consequently, these spectra are due to internal rotations in the lattice. Few data for disubstituted benzene gave the frequencies (in cm⁻¹, on a 10 scale in parentheses): *p*-C₆H₄Cl₂, 11(2), 15(5), 24(8), 27(8), 37(3), 49(1), 51(3); *m*-C₆H₄Cl₂, 24(10), 30(3), 40(1), 67(0), 79(6), 110(3), 110(0); *p*-C₆H₄Cl, 21(8), 25(8), 24(11), 43(8), 51(6), 74(5), 80(2). The previously reported line 25 cm⁻¹ in *p*-C₆H₄Cl consists actually of 3 lines, 24 and 27, polarized differently. The frequency of 30 cm⁻¹ which occurs also in *p*-C₆H₄Cl₂, *p*-C₆H₄Br₂, and *p*-C₆H₄BrCl, appears to be due to rotation around the axis running through the 2 halogen atoms. The lines 115 of *p*-, and 101 of *m*-C₆H₄Cl₂ are found also in the liquids and are, consequently, due to intramol. vibrations. The same applies to the frequencies 100 and above, in *p*-C₆H₄Cl₂. A comparison of the frequencies proper to the crystals is pointless, as the 4 compounds are not isomorphous. N. Thon

USSR/Physics - Combination Scattering
Spectra

Apr 50

"Spectra of Combination Scattering of Small Frequencies in Para-, Meta-, and Ortho-Diiodobenzene Crystals," Ye. F. Gross, A. V. Korshunov, V. A. Sel'kin, Leningrad State U, 4 pp

"Zhur Eksper i Teoret Fiz" Vol XX, No 4

Problems encountered in dynamics of molecular crystalline lattices are considered best studied by method of combination spectra. Introduces experimental results in study of subject spectra. Table gives frequency (in cm^{-1}) versus intensity of line for subject chemicals. Submitted 15 Dec 49.

159T99

C. 4

Vibration spectrum of the hydrogen bond. Low frequencies in the Raman spectrum of ice crystals. E. P. Gross and V. I. Val'kov (A. A. Zhdanov State Univ., Leningrad). *Doklady Akad. Nauk S.S.S.R.* 74, 431 (1969); *ibid.* 67, 619; *C.A.* 64, 4375, 9376. The intensities of Raman lines observed in the low-frequency range below 300 cm^{-1} , and attributed to vibrations of the H-bond, follow only qualitatively the theoretically expected pattern whereunder consecutive lines should decrease in intensity by the factor $\sim 1/n$. The fact that the quant. intensity relations are at variance with this scheme indicates that, on account of the very strong anharmonicity of the H-bond, the transition probabilities for the different excited states may be unequal. Further exptl. details of the H-bond spectrum was gained from exptl. detns. of the low-frequency Raman spectrum of an artificially grown ice crystal, at -4° . In 100 hrs. exposure, the following lines were observed: 200, 272, 282, 282, 212, 190, 177 cm^{-1} . The previously known 212 line is the most intense. The new lines are diffuse and hard to resolve. The alleged 60- cm^{-1} line could not be detected. The identification of this spectrum with the vibration spectrum of the H-bond in ice is borne out by an approx. calcn. of the frequency energy D by $D = (\omega_1 + \Delta)^2/2\Delta$, where ω_1 = frequency of the fundamental H-bond vibration, and the av. difference of consecutive frequencies (actually decreasing from 27 to 10) is taken for the anharmonicity Δ . This calcn. gives $D = 7.1 \text{ kcal./mole}$, close enough to the accepted 0.4 ± 0.5 in view of the approx. nature of the estn. N. Thom

USSR/Chemistry - Fuels, Synthetic Elastomers 11 Dec 50

17219
"Spectra of Combination Dispersion and the Process of Isobutene Polymerization," Ye. F. Gross, Corr. Mem, Acad Sci USSR, K. B. Nel'son, Ya. M. Slobodin, Leningrad State U Imeni A. A. Zhdanov, Mil Med Acad Imeni S. M. Kirov

"Dok Ak Nauk SSSR" Vol LXXV, No 5, pp 697-700

Constitution of the dimer (I), trimer (II), tetramer (III), pentamer (IV), and polymer having av mol wt of 800 (V) deduced from their spectra. Found I to C

17219

USSR/Chemistry - Fuels, Synthetic Elastomers (Contd) 11 Dec 50

Composition of the 2 possible isomers; II of isomers having double bond both in middle of chain and at end, while mol of III, IV, and V have double bonds at end of chains only.

17219

180734

USSR/Chemistry - Fuels
Plastics

Apr 51

"Spectra of Combination Scattering of Light of Low-Molecular Polymers and the Polymerization of Isobutene," Ye. F. Gross, K. V. Mel'son, Ya. M. Slodkin, State U imeni A. A. Zhdanov, Leningrad

"Zhur Fiz Khim" Vol XXV, No 4, pp 504-512

Obtained spectra of combination scattering of light for dimer, trimer, tetramer, pentamer, and polymer of isobutene with av mol wt 800. Analyzed vibration frequency of =C=CH_2 group. Detd positions of

LC

180734

USSR/Chemistry - Fuels (Contd)

Apr 51

C-C bonds in various forms of each polymer, included polymers tended toward mol structure with C-C bond at end of chain.

LC

180734

181784

GROSS E. F.

USSR/Physics - Spectrography

Apr 51

"Combined Dispersion of Light of Second Order,"
E. F. Gross, P. P. Pavinskiy, A. I. Stekhanov

"Uspekhi Fiz Nauk" Vol XLIII, No 4, pp 536-586

Describes phenomena of combined dispersion of
2d order and results of theoretical and exptl
res of 2d-order light dispersion by crystals.

181784

USSR/Nuclear Physics - Deuterium Oxide 11 Dec 51
(D₂O)

"Combination Scattering of Light [Raman Effect] in Crystals of Heavy Ice (D₂O)," Ye. F. Gross, Corr Mem, Acad Sci USSR, V. I. Val'kov, Phys Inst, Leningrad State U Imeni Zhdanov

"Dok Ak Nauk SSSR" Vol LXXXI, No 5, pp 761-763

Since no information on the spectrum of combination scattering in heavy ice (D₂O) could be found in the literature, the authors investigated the entire spectrum of combination scattering of light in heavy ice crystals and compared its complete

210776

USSR/Nuclear Physics - Deuterium Oxide 11 Dec 51
(D₂O) (Contd)

spectrum with that of light ice (H₂O). They observed the following frequencies of the scattering spectrum in D₂O ice: 2,690, 2,500, 2,445, 2,330, 275, 256, 236, 218, 203, and 166 cm⁻¹. Submitted 11 Oct 51.

210776

GROSS, Ye. F. —

1. GROSS, E. F.
2. USSR (600)
4. Physicists
7. Prof. V. N. Tsvetkov, winner of the Stalin Prize. Vest. Len. un 7 No 6, 1952.

9. Monthly List of Russian Accessions, Library of Congress, May 1953. Unclassified.

GROSS, YE. F.

USSR/Physics - Spectroscopy, Crystals May 52

"Some Laws Governing the Spectra of Low-Frequency Combination Scattering [Raman] of Isomorphous Crystals of Dihalogen-Substituted Derivatives of Benzene," Ye. F. Gross, A. V. Korshunov, V. A. Seidn, Leningrad State U

"Zhur Kasper 1 Teoret Fiz" Vol 22, No 5, pp 579-589

Outlines exptl research on subject spectra which allows one to attribute some spectral frequencies of scattering to orientational mol oscillation in the cryst lattice. Proposes the assumption that the revealed low-frequency lines of small intensity

21791

are excited by translational mol oscillations, due to imperfections of the cryst lattice. Indebted to N. N. Porfir'yeva. Received 7 Sep 51.

21791

GROSS, Ye. F.; ROLESOVA, V. A.

Raman spectra of two-component silicate glasses. Zhur. Fiz. Khim.
26, 1673-80 '52. (MLRA 6:1)
(CA 47 no.13:6254 '53)

1. Leningradskiy gosudarstvennyy universitet.

74117

USSR/Physics - Infrared

11 May 52

"Light Absorption by Cuprous Oxide Crystal in Infrared and Visible Part of the Spectrum," Ye. F. Gross, Corr Mem, Acad Sci USSR, N. A. Karyyev, Leningrad Phys-Tech Inst, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol 84, No 2, pp 261-264

Authors systematically investigate absorption spectra of semiconducting crystals. Authors state that Zhuze and Ryvkin (cf. "Zhur El'sper i Teoret Fiz" 20, 152, 1950) ascribed Cu₂O

231T97

photocond to impurity mechanism. Max absorption in infrared is found at 8.9μ and 12.6μ and is explained by electron transitions. Acknowledge the interest and discussions of A. F. Ioffe and the assistance and cooperation of V. P. Zhuze. Submitted 13 Mar 52.

231T97

GROSS, Ye. F.

USSR/Physics - Exciton Spectrum 21 May 52

"Optical Spectrum of the Exciton," Ye. F. Gross,
Corr Mem, Acad Sci USSR, N. A. Karryev, Lenin-
grad Phys-Tech Inst, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXXIV, No 3, pp 471-474

In a previous work ("Dok Ak Nauk SSSR" Vol LXXXIV,
No 2, 1952) the authors described the phenomena
observed by them during absorption of light in
Cu₂O crystal in the infrared and visible part of
the spectrum. In this work they describe further
investigations on light in Cu₂O crystal for the
case of the visible part of the spectrum. The

225T81

results of these investigations were reported
19 Sep 51 at the Phys-Tech Inst, Acad Sci USSR,
in Leningrad, and on 12 Dec 51 at the Phys Inst,
Acad Sci Ukrainian SSR, at Kiev. References: Ya.
I. Frenkel', 1936; V. P. Zhuze and S. M. Ryvkin;
I. M. Dykman and S. I. Pekar. Submitted 17 Mar 52

(CPA 56 no. 668 '53)

225T81

GROSS, Ye.F., chlen-korrespondent; ZAKHARCHENYA, B.P.

Excitons in a cuprous oxide crystal. Dokl.AN SSSR 90 no.5:745-748 Je '53.
(MLRA 6:5)

1. Leningradskiy fiziko-tekhnicheskii institut Akademii nauk SSSR. 2. Akademiya nauk SSSR (for Gross). (Electrons) (Cuprous oxide)
(Absorption of light)

Describe phenomena observed by the authors during study of the absorption of light in cuprous oxide, and discuss their new investigations into the phenomenon of an electron's transition to the free zone during the photo-dissociation of an exciton, which corresponds to the complex absorption spectrum beyond the limits of hydrogen-like series. 260T95

GROSS, Ye. F.

USSR/Physics - Low Temperatures,
Cuprous Oxide

11 Sep 53

"Excitons in Cuprous Oxide Crystal at Temperature of Liquid Helium (4.2°K)," Ye. F. Gross, Corr Mem Acad Sci USSR, B. P. Zakharchenya and N. M. Reynov, Leningrad Phys-Tech Inst, Acad Sci USSR

DAN SSSR, Vol 92, No 2, pp 265-267

Continue previous investigations of spectrum of Cu_2O (Gross et al, DAN 84, Nos 2, 3, (1952), 90, No 5, (1953)) using still lower temps and equipment of higher disperison. Absorption lines of H-like series,

269T107

ascribed to exciton spectrum, narrowed and shifted violetwards. Results are tabulated. Rec 9 Jul 53.

USSR/Physics

Card : 1/1

Authors : Gross, E. F. Memb. Corres. of Acad. of Sc. USSR; Zakharchenya, B. P. and Reynov, N. M.

Title : Stark effect on excitons of cuprous oxide crystals in a heterogeneous electric field.

Periodical : Dokl. AN SSSR, 97, Ed. 2, 221 - 223, July 1954

Abstract : The article deals with the Stark effect as observed on the spectrum of cuprous oxide crystals placed in a strong heterogeneous electric field which was built with specially designed and arranged electrodes. Picture-diagrams and a table show the results of the experiment. Two references: 1 since 1913. Table, drawing, photos.

Institution : Acad. of Sc. USSR, The Physico-Techn. Institute. Leningrad

Submitted : June 7, 1954

USSR/ Physics - Spectral analysis

Card 1/1 Pub. 22 - 12/40

Authors : Gross, E. F., member correspondent of the Acad. of Scs. of the USSR; Zahhar-
chanya, B. P.; and Reinov, N. M.

Title : Fine structure of the exciton series lines in cuprous oxide

Periodical : Dok. AN SSSR 99/2, 231-234, Nov 11, 1954

Abstract : A spectral analysis is presented of the excitons series at low-temperatures. A spectrograph with a diffraction grating of a large grating-constant was used for the analysis. It revealed a fine structure of cuprous oxide (Cu_2O) crystals - many fine absorption lines were observed in the yellow portion of the spectrum. Six references; 5-USSR (1952-1954). Photo-diagram; tables; diagrams.

Institution : Leningrad Physico-Technical Institute of the Acad. of Scs. Of the USSR

Submitted : ...

Gross, E. F.

USSR/Physics - Zeeman's effect

Card 1/1 Pub. 22 - 10/45

Authors : Gross, E. F., memb. corresp. of the Acad. of Scs. of the USSR; Zakharchenya, B. P.; and Reynov, N. M.

Title : Zeeman's effect in the spectrum of the exciton of cuprous-sulfate crystals

Periodical : Dok. AN SSSR 99/4, 527-528, Dec 1, 1954

Abstract : A study of the causes of existence of an abundant number of absorption lines in the spectrum "of the Cu_2O " exciton (combination of a hole and an electron) is described. The study was conducted with the help of a wide dispersion spectral apparatus in a strong magnetic field. Four USSR references (1952-1954). Table; illustrations.

Institution : Leningrad Physico-Technical Institute of the Acad. of Scs. of the USSR

Submitted : ...

USSR/Chemical Technology. Chemical Products and Their Application -- Silicates.
Glass. Ceramics. Binders, I-9

Abst Journal: Referat Zhur - Khimiya, No 2, 1957, 5166

Author: Gross, Ye. F., Kolesova, V. A.

Institution: Academy of Sciences USSR

Title: Raman Effect and Structure of Vitreous Bodies

Original

Publication: Sb. Stroyeniye stekla, M.-L., AN SSSR, 1955, 56-61

Abstract: Data are presented concerning change in frequencies and intensities of Raman spectra on alteration of composition of glass (G) (quartz, sodium silicate and potassium silicate). On the basis of anticoincidences of vibration spectra of crystalline quartz and vitreous silica the conclusion is drawn that, apparently, network of vitreous silica cannot be considered to be a faulty lattice of crystalline quartz. From investigations of vitreous silica by other methods (for instance, density measurements, x-ray diffraction analysis), and also on taking into account the invariable separation of cristobalite crystals on

Card 1/2

USSR/Chemical Technology. Chemical Products and Their Application -- Silicates.
Glass. Ceramics. Binders, I-9

Abst Journal: Referat Zhur - Khimiya, No 2, 1957, 5166

Abstract: devitrification of vitreous silica, the authors reach the conclusion that structure of the network of this G is close to the structure of the cristobalite lattice. In the case of alkali silicate G there is had a gradual transition from structure of vitreous silica to that of vitreous metasilicate of the alkali metal, similarly to that observed in the case of mixed crystals. Absence of superposition in spectra of G having intermediate compositions indicates that the network of these G comprises no large regions of chemical heterogeneity. Two-component alkali silicate G must be regarded either as being entirely uniform chemically (the atoms are statistically distributed within the G network), or as having very small regions of chemical heterogeneity -- so small, that one may assume a mutual effect of atoms of one heterogeneous region on natural oscillations of atoms located within another region. Concerning the question of the existence in G of crystallites, i.e., of regions of high spatial orderliness, neither spectroscopy nor x-ray examination can provide, at the present time, either a positive or a negative answer.

Card 2/2

8/10/77
USSR/Chemical Technology. Chemical Products and their Application.
Glass. Ceramics. Building Materials.

J-12

Abs Jour: Referat Zh.-Kh., No 8, 1957, 27616

Author : Ye.F. Gross.

Inst :

Title : Are there Crystallites in Glass?

Orig Pub: vSb: Stroyeniye stekla. M.-L., AN SSSR, 1955, 322-324.

Abstract: The author points out that the existence of crystallites in glass has not been established experimentally. This refers to the experiments of A.A. Lebedev, N.A. Tudorovskaya, A.I. Stozharov and V.A. Florinskaya. The reason, why it is impossible spectroscopically to prove the presence of crystallites in glass, is given. See also RZhKhim, 1957, 5166.

Card : 1/1

-15-

gross, Ye. F.
USSR/Chemical Technology. Chemical Products and their Application.
Glass. Ceramics. Building Materials.

J-12

Abs Jour: Referat Zh.-Kh., No 8, 1957, 27618

Author : Ye.F. Gross.

Inst :

Title : Once More about Crystallites.

Orig Pub: vSb: Stroyeniye stekla. M.-L., AN SSSR, 1955, 324-325.

Abstract: Considerations are expressed, which confirm the author's opinion that it is impossible to say anything definite concerning the presence of crystallites in glass basing on the data of infrared spectra (and of any vibrating spectrum in general). See RZhKhim, 1957, 5166, 5169 and 5170.

Card : 1/1

-17-

USSR/Chemical Technology. Chemical Products and their Application.
Glass. Ceramics. Building Materials.

J-12

Abs Jour: Referat Zh.-Kh., No 8, 1957, 27617.

Author : Ye.F. Gross.

Inst :

Title : Answer to Publication of V.A. Florinskaya.

Orig Pub: vSb: Stroyeniye stekla. M.-L., AN SSSR, 1955, 332-335.

Abstract: Proofs that V.A. Florinskaya has not had any experimental reasons to assert the presence of crystallites in glass are brought forward. See RZhKhim, 1957, 5166, 5169 and 5170.

Card : 1/1

-16-

FD-3052

USSR/Physics - Absorption spectrum

Card 1/2 Pub. 153 - 22/23

Author : Gross, Ye..F.; Yakobson, M. A.

Title : Brief communication. Linear absorption spectrum in cadmium sulfide crystal at the temperature of liquid helium

Periodical : Zhur. tekhn. fiz., 25, February 1955, 364

Abstract : The senior writer observed (DAN SSSR, 84, 471, 1952) in the absorption spectrum of CdS crystal at $T=77.3^{\circ}\text{K}$, the temperature of liquid nitrogen, a sharp line and wider band situated around the long-wavelength edge of the ground light absorption of CdS crystal lattice, and in further development of this investigation of exciton absorption in Cu_2O crystal (DAN SSSR, 90, 745, 1953; DAN SSSR, 92, 265, 1953 and 99, 231, 1954) undertook new experiments with CdS crystal at $T=4.2^{\circ}\text{K}$, the temperature of liquid helium, in the course of which experiments it was clarified that the long-wavelength edge of ground absorption of CdS crystal possesses just as does Cu_2O crystal a very complex structure (at $T=4.2^{\circ}\text{K}$ the senior author and his co-workers observed in the spectrum of CdS

FD-3053

Card 2/2

Abstract : crystal around edge of ground absorption 11 sharp absorption lines and 4 wider bands indicating fine structure). The present brief communication gives a table of the frequencies of these lines and also the frequencies of the edges of the observed bands. The writers note that the structure of the absorption edge depends upon the polarization status of the absorbed light and that the complex structure of the absorption spectrum of CdS points to the large number of electron levels in the forbidden zone of CdS crystal. Just as in the case of Cu_2O the writers associate the structure of the edge of the ground absorption of CdS with the excitation of excitons in the crystal lattice of CdS. They thank N. M. Reynov, head of the cryogenics laboratory of the Leningrad Physical Technical Institute. Co-authors of the senior writer in the mentioned earlier works are N. A. Karryev, B. P. Zakharcheniya, and N. M. Reynov.

Institution : -

Submitted : January 17, 1955

GROSS, Ye.F.; BELLE, M.L.

Internal photoeffect and the structure of basic absorption margins in
crystals. Zhur.tekh.fiz. 25 no.5:948-949 My '55. (MLRA 8:7)
(Crystallography) (Photoelectricity)

FD-302

USSR/Physics - Spectrum

Card 1/1 Pub. 153 - 16/19

Author : Gross, Ye. F.; Kaplyanskiy, A. A.

Title : Spectrum of absorption edge, internal photoeffect, and structure of crystals

Periodical : Zhur. tekhn. fiz., 25, No 9 (September), 1955, 1661-1663

Abstract : The writers discuss the difficult factors that determine the possibility of the existence of exciton levels and their properties; namely, the number of levels, their energy, rules of disposition, width, intensity, and polarization of corresponding absorption lines. In particular they discuss the problem of what influence is exerted by the structure of the crystalline lattice upon the line spectrum of absorption edge. They conclude that the exciton mechanism governing the excitation of the internal photoeffect has received new confirmation. Nine references: e.g. Ye. F. Gross and N. Karryyev, DAN SSSR, 81, 47, 1952; Ye. F. Gross and B. P. Zakharcheniya, DAN SSSR, 90, 745, 1953.

Institution :

Submitted : May 20, 1955

K-5

Category : USSR/Optics - Physical optics

Abs Jour : Ref Zhur - Fizika, No 1, 1967, No 2315

Author : Gross, Ye. F. Kapiyanskiy, A. A.

Title : On the Absorption Spectra of Crystals of Certain Iodides

Orig Pub : Zh. tekhn. fiziki, 1965, 25, No 12, 2061-2068

Abstract : Absorption spectra of single crystals of red EgI_2 (I), FbI_2 (II), and CdI_2 (III) were investigated. Crystals I were in the form of plates having a thickness d from several tens to several hundreds of microns and an optical xx axis c in the plane of the plate. I displays strong dichroism at 77.3°K and at 20°K . If the plane of the crystal is perpendicular to the ray of light, one observes only the sharp edges of the absorption of the ordinary and extraordinary rays, the former being shifted by 250-300 Å toward the longer wavelength relative to the latter. At 77.3°K the 5330 Å is fully polarized with its electric vector E perpendicular to c . At 4.2°K , the portion of the absorption spectrum of the ordinary ray between the two absorption edges differs from the 77.3°K spectrum in the following respects: the 5330 Å line becomes considerable narrower and shifts towards 5296 Å, and a weaker narrow 5321 Å line appears; the edges of the continuous absorption shifts toward the shorter waves and forms a small step of continuous absorption at 5260 Å, with a weak 5238 line visible against its background; all the lines and the step are similarly polarized with E perpendicular to c . Crystals II are in the form of plates of ranges from 0.1 to

Card : 1/2

K-5

Category : USSR/Optics - Physical Optics

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 2315

several microns; the plane of which is perpendicular to the c axis and are grown from aqueous solutions. At 77.3°K, the crystals with $d \approx 1 \mu$ display only a sharp absorption edge at 4970-5000 Å, and in the crystals with $d \sim 0.1 \mu$ one can see on this edge bands at 4948 (a strong one, $\Delta\lambda = 10\text{Å}$), 4060 ($\Delta\lambda = 200\text{Å}$) and 3750 Å ($\Delta\lambda = 30\text{Å}$). Near 3460 Å, the continuous absorption grows sharply, forming the edge of a step that forms the background for bands at 3130 Å ($\Delta\lambda = 10\text{Å}$), 2780 Å (strong, $\Delta\lambda = 40\text{Å}$), 2690 Å, and 2610 Å (both weak). At 4.2°K the spectrum is almost unchanged, at 20°K the bands broaden strongly and shift toward the long waves. The high absorption coefficient in the lines and in the bands (10^4 – 10^5 cm^{-1}), the fact that the stoichiometry of the crystals is maintained as the result of the manner in which they are grown, and the constancy of the structure of the characteristic absorption upon prolonged illumination indicate, in the authors' opinion, that this structure can be attributed to the fundamental lattice of crystals I and II. In the case of I this is ascribed to exciton excitation. Crystals III were grown from aqueous solution or from a molten mass and made in the form of hexagonal plates with a plane perpendicular to c and with $d = 50$ – 500μ . A narrow 3835 band, the intensity of which is strongly dependent on the growth conditions, is located near the absorption edge in the vicinity of 3500 Å. This band splits up into narrow 3832 and 3845 Å lines at 4.2°K.

Card : 2/2

GROSS Ye. F.
USSR/ Physics - Crystallography

Card 1/1 Pub. 22 - 17/62

Authors : Gross, Ye. F., Member-Correspondent of the Acad. of Sc., USSR; and Yakob'son,
M. A.

Title : A complex structure of the end of the basic absorption of greenockite
crystals

Periodical : Dok. AN SSSR 102/3, 485 - 488, May 21, 1955

Abstract : New experimental studies of the absorption spectrum of greenockite crystals (CdS) are described. The studies revealed a complexity in the long-wave absorption spectrum of the CdS crystals which indicates the presence of a number of discrete energy levels in the crystals. Nine references: 1 USA, 3 Germ., and 5 USSR (1947-1955). Table; illustrations.

Institution : Acad. of Sc., USSR, Physico-Technical Institute

Submitted : February 4, 1955

USSR/Physical Chemistry - Molecule, Chemical Bond.

B-4

Abs Jour : Referat Zhur - Khimiya, No 1, 1957, 141

Author : Ye.F. Gross, I.M. Ginzburg.

Inst :

Title : Spectra of Composite Scattering of Crystal of Molecular Compounds.

Orig Pub : Optika i spektroskopiya, 1956, 1, No 5, 710-714

Abstract : With a view to investigate the influence of the formation of molecular compounds on spectra, the spectra of monocystals SbCl_3 (I) and SbBr_3 (II) were studied. Low frequencies of (in cm^{-1}) 35, 50, 66, 96 and 63 and frequencies of intramolecular oscillations (IMO) of 133, 152, 317, 342 for I and 92, 110, 227 and 236 for II were found. The minimum and maximum moments of inertia ($I_x \cdot 10^{-40}$ and $I_y \cdot 10^{-40} \text{ g} \times \text{sq.cm}$) of the molecules of I and II are: $I_x = 303$ and 696 , $I_y = 523$ and 1210 . The low frequencies are satisfying the relation

$$I_1^2 / I_2^2 = I_2 / I_1 \quad (1) \text{ valid}$$

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USSR/Physical Chemistry - Molecule, Chemical Bond.

B-4

Abs Jour : Ref Zhur - Khimiya, No 1, 1958, 141

for the frequencies of the rotational oscillations in isomorphous crystals. The low and the IMO frequencies of $2\text{SbCl}_3 \cdot \text{C}_6\text{H}_6$ (III) and $2\text{SbBr}_3 \cdot \text{C}_6\text{H}_6$ (IV) are as follows:

22, 43, 64, 83, 110, 117 (III); 22, 42, 58, 71 (IV); and 136, 162, 312, 327, 350, 606, 989, 1176, 1573, 1607, 3062 (III); 89, 102, 213, 225, 241, 990, 3065 (IV).

The comparison of the spectra of I, II, III and IV leads to the conclusion that the low frequency spectra of I, II and III, IV differ essentially, while the IMO frequencies of III, IV coincide with the IMO frequencies of I, II and C_6H_6 . Consequently, the molecules of I, II and C_6H_6 move in lattices as a whole with reference of one to another. The frequencies 22 and 42 - 43 of III and IV refer to the rotational oscillations of C_6H_6 . The frequencies 64, 83, 110 (III) and 42, 58, 70 (IV) satisfy (1) and correspond to the rotational oscillations of the molecules of I and

Card 2/3

USSR/Physical Chemistry - Molecule, Chemical Bond.

B-4

Abs Jour : Ref Zhur - Khimiya, No 1, 1958, 141

II located in approximately equal force fields.

Card 3/3

GROSS, YE.F.

GROSS, Ye.F.; KAPLYANSKIY, A.A.

Absorption and emission spectra of cuprous chloride inclusions in rock salt crystals. Opt. i spektr. 2 no.2:204-209 F '56. (MIRA 10:3)
(Copper chlorides--Spectra) (Sodium chloride--Spectra)

Gross, F. I.

Exciton excitation spectrum in solids. E. F. Gross
(Leningrad Phys. Tech. Inst.). Izvest. Akad. Nauk
S.S.S.R., Ser. Fiz. 20, 89-104(1956).—It is shown that the
absorption edge of Cu_2O at λ 6300 Å. and 20° has a com-
plex structure with 2 steps at 1.946 e.v. and 1.942 e.v. At
each step 2 very narrow emission bands have been observed.
The absorption in the steps decreases with a decrease in
temp. The absorption of the continuous spectrum also
decreases with lowered temp., and 6 separate absorption
lines appear on the continuous background. The lines
form a series of frequencies $\nu_n = 17400 - 785/n^2 \text{ cm}^{-1}$
($n = 1, 2, 3, \dots$). The H-type quantum character of the
series is attributed to exciton excitation, the exciton being
considered as a quasi H-atom combination of an electron
and a hole. The exciton in Cu_2O is a "free" travelling
exciton. Other absorption expts. were made on Cu_2O
plates polished down to 20 μ . A new green series of 4 lines
was discovered at 77.3°K., with $\nu_n = 18507 - 1246/n^2$
($n = 2, 3, 4, 5$), also attributed to the exciton. An indication
of the presence of the first line of the green series was found
at 4.2°K. At 1.3°K. a fine structure of the lines of the
yellow series was observed; some deviations from H-type
orbits are present, especially for low quantum nos. n . A
Stark effect at applied elec. fields of 20 kv. and 70 kv. was
observed; however this effect was considerably different
from the behavior of the at. spectral lines of H, indicating a
more complex nature of the exciton. S. Pakswar

Chem

kan

Category : USSR/Optics - Physical Optics

K-5

Abs Jour : Ref Zhur - Fizika, No 1, 1957, N: 2316

Author : Gross, Ye.F., Kaplyanskiy, A.A., Novikov, B.P.

Title : Photoconductivity, Radiation, and Absorption of Light in HgI_2 Crystals

Orig Pub : Zh. tekhn. fiziki, 1956, 26, No 3, 697-700

Abstract : An investigation was made of the distribution of photoconductivity σ_{ph} of single crystals of red HgI_2 and crystals (I) at 77.3 K in polarized light. The optical axis c is parallel to the surface of plate I. If the light is incident exactly perpendicular to the surface, the σ_{ph} curve for a ray with E perpendicular to c has a rapid rise near the sharp absorption edge of this ray ($\lambda = 5350--5390$), and then diminishes slowly toward the short-wave side. This decrease contains a narrow gap, the position of which coincides with the polarized 5330 A exciton absorption line (E is perpendicular to c). The σ_{ph} curve for a ray with E parallel to c has a broad maximum, corresponding to the absorption edge of the extraordinary ray ($\lambda = 4950--5150$ A). If plate I is turned slightly about an axis perpendicular to the surface, a narrow peak appears at 5330 A. The fact that the 5330 A exciton line appears both in the form of a peak and in the form of a gap in σ_{ph} is ascribed to the variation in the absorption of light of varying polarization as a function of the crystal orientation relative to the incident ray. The peak of σ_{ph} is observed when

Card : 1/2

Category : USSR/Optics - Physical Optics

K-5

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 2316

excitons are formed over the entire thickness of the crystal, while the gap in σ_{ph} appears when they are created and annihilated in the surface layers. It is deduced that the photoeffect is partly due to exciton excitation. An assumption is made that the photoeffect occurring upon absorption in the continuous spectrum is also due to exciton formation by recombination of electrons and holes.

Card : 2/2

Gross, Ye.F

78c 10
1-PMZ

Zeeman effect in the yellow series of excitation of a cuprous oxide crystal. Ye. F. Gross, B. P. Zakharchenya, and N. M. Reznov (Phys.-Tech. Inst., Acad. Sci. S.S.S.R., Leningrad.) *Zhur. Tekh. Fiz.* 26, 700-1 (1950).—In addition to previous investigations of the absorption lines of Cu₂O crystals (cf. C.A. 50, 6030d) the Zeeman effect of the yellow series was measured with a spectrograph of 1.6 Å/mm. dispersion at 1.3°K. (the crystal was cooled with liquid He). In a magnetic field of 27000 oersteds, lines of the series $n = 3, 4, 5$, and 6 on the absorption spectrogram, in nonpolarized light, changed into doublets. The sep'n. of the line $n = 2$ was not accomplished as a result of its great width. The investigations in polarized light indicated that the doublets may be observed in both π and σ components. The distance $\Delta\lambda$ between components of doublets was const. for all lines and was equal to the distance between σ components ($\Delta\lambda = 1.0 \text{ Å.}$) of the first line of the series. The lines of the series sep'g. in a magnetic field were displaced toward the short wave lengths, relative to their initial position in the absence of the magnetic field. The displacement was increased with the quantum no. of the line, for $n = 5$ it was 0.5 Å. in a magnetic field of 27000 oersteds. Paul Paliyenko

3

SHP KMS
LFW

Category : USSR/Electricity - Semiconductors

G-3

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 4212

Author : Gross, Ye.F., Kaplyanskiy, A.A., Novikov, B.V.

Title : Structure of Spectral Curve for Internal Photoeffect in Crystals of Cadmium Sulfide

Orig Pub : Zh. tekhn. fiziki, 1956, 26, No 4, 913-916

Abstract : A connection is established between the line spectrum of the absorption edge and the spectral distribution of photoconductivity of a CdS crystal. According to the concepts concerning the exciton mechanism of photoconductivity, each line in the absorption spectrum corresponds to a maximum of photoconductivity. When CdS ($T = 77.3^{\circ}\text{K}$) is exposed to light so polarized that the E-vector, the optical axis c of the crystal, and the direction of the incidence of the ray lie in the same plane (the E vector and the axis c form thereby a small sharp angle), in the spectral distribution of the photoconductivity displays narrow maxima at 4869, 4840, 4820, and 4710 Å. The first three maxima are in good agreement with the lines in the absorption spectrum. In the case when E is perpendicular to c , the wavelengths 4869, 4840, and 4820 Å correspond to dips in the curves of the spectral distribution of photocon-

Card : 1/2

Category : USSR/Electricity - Semiconductors

G-3

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 4212

ductivity. Such a phenomenon was observed earlier by the authors in the case of HgI_2 (Referat Zh. Fizika, 1956, 2316) and is connected, in their opinion, with an increase in the absorption coefficient when E is perpendicular to c . If the coefficient is very large, all the light is absorbed near the surface, which may cause a reduction in photoconductivity owing to the increased exciton annihilation.

Card : 2/2

Gross, E.F.

USSR / Electricity

G

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9/28

Author : Gross, E.F.

Inst : Leningrad Physico-Technical Institute, Academy of Sciences
USSR

Title : Spectrum of Excitation of Excitons in Solids.

Orig Pub : Zh. tekhn. fiziki, 1956, 26, No 5, 938-940

Abstract : A very complete survey and critical analysis of the experimental material devoted to the study of the optical spectra of excitation of excitons in crystals of Cu_2O . Data are given for the yellow and green series of absorption lines, and also for the fine structure of the yellow series. Data for the line of the series (without account for the structure) fit quite well into the hydrogen-like model of the exciton, but precise measurements of the Stark effect, described

Card : 1/2

USSR / Electricity

G

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 0728

Abstract : in detail in the work, indicate that the spectrum of the exciton of a crystal Cu_2O is far from hydrogen-like. The author proposes that the exciton should be more readily considered as a system similar to the complex atom. Bibliography. 45 titles.

Card : 2/2

K-5

Gross, Ye. F.
USSR/Optics - Physical Optics

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 12887

Author : Gross, Ye. F., Yakobson, M. A.

Inst :

Title : Radiation spectrum of the Exciton.

Orig Pub : Zh. tekhn. fiziki, 1956, 26, No 6, 1269-1371

Abstract : An investigation was made of the azure luminescence of a CdS crystal at 77.3° K. When the excitation is produced by the 3663A mercury line or by the continuous spectrum of an incandescent lamp in the blue region of the spectrum, one observes the following lines and radiation bands (the numbers in the parentheses indicate the boundaries of the bands): (4805, 4813), (4838, 4858), 4870, 4875, 4880, 4886, 4925, 5009. The radiation line 4870 A coincides with the exciton absorption line at 77.3° K and is polarized the same as the latter. The 4870 A line and the 4858 -- 4838 and 4813 -- 4805 A bands are the strongest in the

Ca

Card 1/2

Thursday, July 27, 2000

CIA-RDP86-00513R0000

B-5

Gross, Ye. F.
USSR/Physical Chemistry. Crystals.

Abs Jour: Ref Zhur-Khimiya, No 5, 1957, 14520

Author :

Inst :

Title :

Author : E. F. Gross, V. V. Sobolev

Title : Absorption Spectra and Excitons Emissions in a CdSe Crystal

Orig Pub: Zh. tekhn. fiziki, 1956, 26, No 7, 1622-1624

Abstract: In the absorption spectrum of monocrystalline plates of CdSe, 10-30 microns thick, at 4.2°K, one observes around the area of main absorption in the region of 6653-6800 A many clearly defined lines and bands which are ascribed to the excitation of the exciton. As in the case of CdS, strong lines and bands are located on the short wave side of the region of main absorption while the weak lines and bands are on the long wave side. In the case of CdS, in the CdSe luminescence spectrum (AD-182cm⁻¹) one observes a group of equidistant "green" luminescence bands, analogous to the "green" luminescence

USSR/Physical Chemistry. Crystals.

B-5

Abs Jour: Ref Zhur-Khimiya, No 5, 1957, 14520

Abstract: bands of CdS and a group of lines analogous to the "violet" CdS luminescence. Wave lengths of the centers of the two short wave emission bands of $\lambda 6811$ and 6837 \AA at 77.3°K , brought to the temp. of 4.2°K , $\lambda 6740$ and 6766 \AA , coincide with two strong lines of absorption, $\lambda 6733$ and 6753 \AA . These bands are considered due to emission of the exciton during its annihilation. As in the case of CdS, lines and bands of CdSe emission and absorption are differently polarized.

Card 2/2

GROSS, Ye. Fe.

Category: USSR / Physical Chemistry - Crystals

B-5

Abs Jour: Referat Zhur-Khimiya, No 9, 1957, 29747

Author : Gross Ye. Fe., Kaplyanskiy A. A., Novikov B. V.

Inst : Academy of Sciences USSR

Title : Exciton Structure of Spectral Curves of Photoelectric Effect in Crystals

Orig Pub: Dokl. AN SSSR, 1956, 110, No 5, 761-764

Abstract: Investigation of spectral distribution of internal photoeffect (PE) of HgI₂ and CdS crystals in the proximity of absorption edge where, according to other publications, narrow exciton absorption lines are present. Measurements were conducted at 77.3°K in polarized light, with monocrystal plates containing the c axis or perpendicular to c, at different mutual orientations of light vector E, direction of light incidence l and axis c. In the case of singular beam, when C and E form an acute angle, HgI has a PE peak at 5330 Å, and CdS has peaks at 4869, 4840 and 4820 Å. Position of all peaks coincides with the position of the lines of exciton absorption of these crystals.

Card : 1/2

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Category: USSR / Physical Chemistry - Crystals

B-5

Abs Jour: Referat Zhur-Khimiya, No 9, 1957, 29747

The conclusion is reached that optical excitation of excitons causes internal PE. Wide structureless PE maxima in the region of absorption edges of ordinary and singular beams are probably connected with continuous absorption. This shows that PE arises also on light absorption in continuous spectra. However in such a case the PE can be caused by excitons formed by recombination of electrons and holes. Occurrence of recombination is confirmed by exciton radiation of these crystals on excitation in principal lattice. With another orientation of c, E and l, in lieu of PE peaks at the location of absorption lines are found PE dips, which are attributed to surface absorption of light. The effects of infrared and red brightening on PE curves have been investigated.

Card : 2/2

-38-

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1982
 AUTHOR GROSS, E.F., ZACHARČENJA, B.P.
 TITLE The Linear and the Quadratic ZEEMAN Effect and the Diamagnetism
 of the Exiton of Cuprous Oxide Crystals.
 PERIODICAL Dokl. Akad. Nauk 111, fasc. 3, 564-567 (1956)
 Issued: 1 / 1957

One of the most interesting objects for the investigation of the excitonlike absorption of light are cuprous oxide crystals. In thin Cu_2O -plates two series of absorption lines could be observed at the temperature of liquid nitrogen: a yellow and a green series, the frequencies of which duly satisfy the series relation of hydrogenlike atoms. The first line ($n = 1$) of the yellow series deviates considerably from the hydrogenlike relation. If the crystal is cooled down to $1,3^\circ \text{K}$ up to 10 terms of the yellow series could be observed. In Cu_2O -crystals the exciton can probably be represented, at least at high excited states, by MOTT'S model, i.e. the exciton can be considered as a system consisting in a definite manner of an electron and a hole. The radius of the exciton orbit is enlarged to the ϵ_0 -fold of the orbit of an isolated atom, where ϵ_0 is the dielectricity constant of the medium. Because of the large dimensions of the exciton the Stark-effect on the lines of exciton absorption could be observed under the effect of comparatively small fields applied to the crystal. In the case of Cu_2O -plates of 100 micron thickness the authors were able to make the following observations at $1,3^\circ \text{K}$ by using a magnet for 30.000 Ørsted:

Dokl.Akad.Nauk 111, fasc.3, 564-567 (1956) CARD 2 / 2

PA - 1982

The first term of the yellow exciton series splits up into a triplet on a magnetic field, which field as usual consists of a not displaced line in the π -component and of a doublet in the σ -component. The considerable narrowing of the lines at $1,3^{\circ}$ K and the use of a spectrograph with high dispersion permitted the observation of the ZEEMAN splitting up not only in the case of the first narrow line with $n = 1$, but also in the case of the other terms of the series. The lines $n = 3,4,5$ split up in the magnetic field into doublets, and these doublets were observed on the occasion of investigations of polarization in the case of π - and also of σ -components. On this occasion the components of the doublets are identical in both components. However, it is possible that ZEEMAN'S splitting up furnishes a quartet (which is not dissolvable) the π - and σ -components of which are very close together. Furthermore, the terms of the series which was split up in the magnetic field shift towards shorter wavelengths. Diamagnetic shift in the exciton spectrum permits the determination of the exciton radius, and at $n = 5$ the value $r_{ex} = 200 \text{ \AA}$ is found. By means of MOTT'S model $r_{ex} = 280 \text{ \AA}$ is found for the analogous quantity, which may be described as good agreement.

Thus the quasiparticle exciton actually exists in a solid with the properties of an atomic system.

INSTITUTION: Physical-Technical Institute of the Academy of Science in the USSR.

GROSS, Ye. I

PRIKHOTKO, A. F.

24(7) p. 3 PHASE I BOOK EXPLOITATION 804/1365

L'vov. Universitet

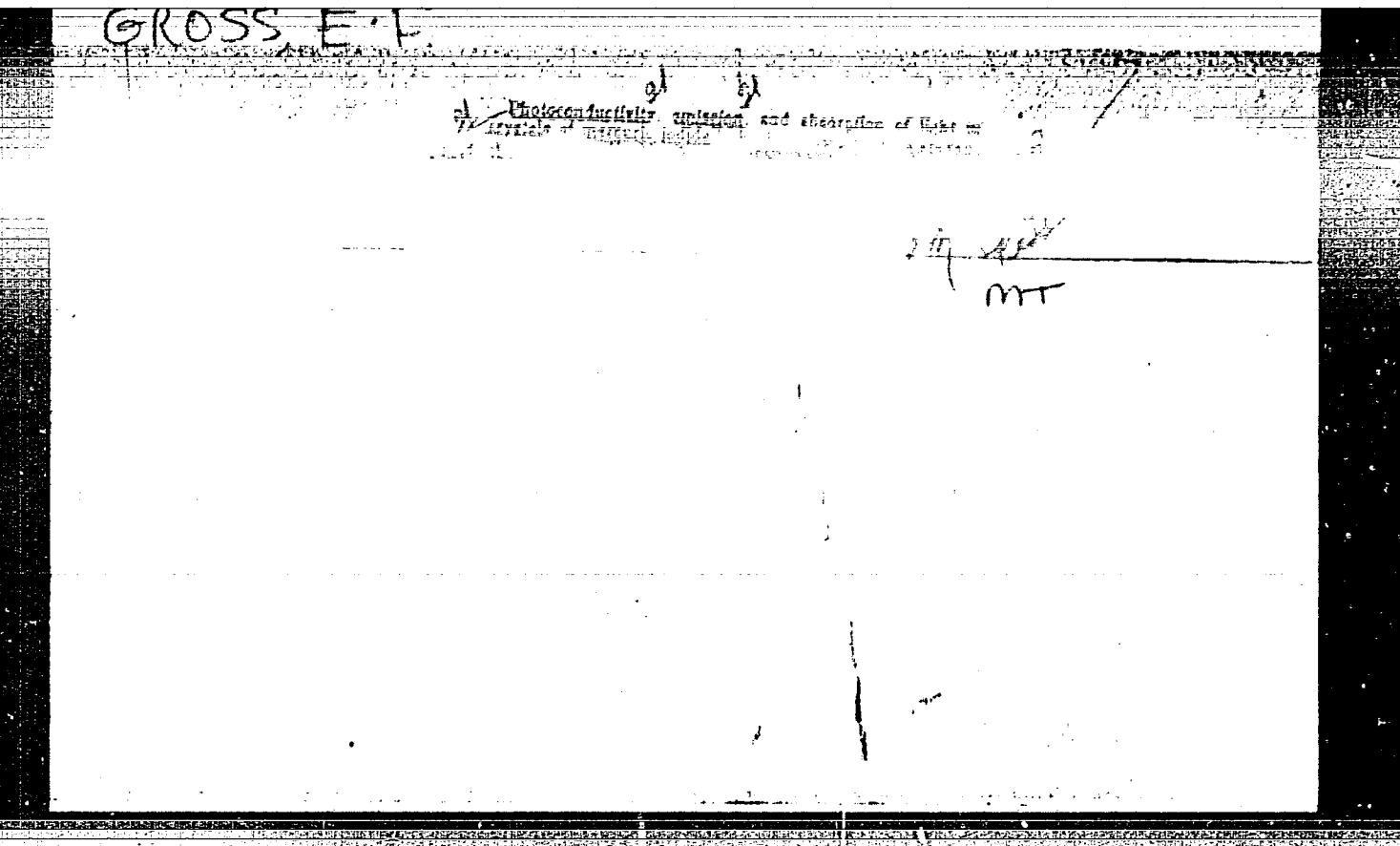
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Card 1/30

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Card 4/30



Phys Spectroscopic study of absorption and emission of cuprous chloride introduced into a crystal of rock salt. E. P. Gerasimov and A. A. Kaplyanski (Phys. Tech. Inst., Acad. Sci. U.S.S.R., Leningrad). *Optika i Spektroskopiya* 2, 201-6 (1957).--The absorption spectrum of NaCl crystals 400 μ thick contg. 10% CuCl at 77.3°K. had two asymmetrical bands: a narrow band at 3840 Å. and a wide one near 3780-3720 Å. The center of the narrow band in crystals 100 μ thick was at 3785 Å. The position of these bands was practically the same as in CuCl alone (cf. Kokhanenko, C.A. 46, 8976d; 50, 67a; Shalnova and Mendakov, C.A. 50, 63i; S., C.A. 49, 12955j). Irradiation of crystals with a 350-m μ source caused emission, the spectrum of which contained a 3831-3841 Å. doublet and two wide bands at 3775 Å. and 3725 Å. This doubling of emission bands to absorption bands was related to the reabsorption of emission. Excitation with Hg λ 254 m μ (absorption region of the activator in NaCl-Cu phosphor (cf. Kato, C.A. 41, 6150i)) at 77.3°K. produced addnl. intense emission band at 348 m μ . In the visible region NaCl-CuCl at 77.3° emitted yellow greenish light which gradually changed to violet with an increase in the temp. This was accompanied by a decrease in the intensity. On annealing of crystals followed by rapid cooling, the structure of absorption and luminescence spectra completely disappeared. However, in annealed and gradually cooled crystals the structure of spectra was restored. Repetition of this process with the same crystal did not affect the reproducibility. In annealed and then rapidly cooled crystals kept at room temp. for

about one year, the spectrum was completely restored. This indicates that colloidal CuCl diffused in NaCl and gradually concentrate back. A study with polarized light showed that the size of CuCl particles was $<0.5 \mu$. This method has many practical advantages (larger size of crystals, inert to humidity in the air, etc.) over the sublimation of CuCl into films (cf. Kokhanenko (C.A. 30, 9161s)).

A. P. Kettley

2
-1

GROSS, Ye.F.; ZAKHARCHENYA, B.P.; RYKOV, N.M.

Zee-man effect in the exciton spectra of cuprous oxide crystals.
Fiz. sbor. no.3:36-39 '57. (MIRA 11:8)

1. Fiziko-tekhnicheskii institut AN SSSR.
(Copper oxides--Spectra) (Excitons) (Magneto-optics)

CROSS, E F

Relationship between the diamagnetism of the CaO crystal exciton and the Rost and qu-Gratie Kraman effect.
B. F. Gross and B. P. Zakharenko (Sci. Acad. U.S.S.R., Moscow, U.S.S.R.). J. Phys. Chem. 18, 66-71 (1967); cf. U.S. SO, 85344. The H-like character of the yellow and green series of absorption lines observed in CaO at 1.5 K. proves the existence of the exciton. Relatively low elec. fields produce an important Stark effect in the lines of the yellow series and, at the same time, localization is observed for levels of high quantum no. which indicates large orbital dimensions. Their order of magnitude has been detd. by the influence of magnetic fields which produce not only a fine structure of the absorption lines, but also a diamagnetic displacement which is proportional to H^2 and n^4 . With $n = 5$ the exciton radius was approx. 200 Å. H. Rosenwasser

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AUTHOR: GROSS, E.F., RAZBIRIN, B.S., JAKOBSON, M.A. PA - 2187
 TITLE: The Line Spectrum at the Edge of the Main Absorption and on
 the Structure of the Crystals of Sulphur-Cadmium. (Russian)
 PERIODICAL: Zhurnal Tekhn.Fiz. 1957, Vol 27, Nr 1, pp 207-209 (U.S.S.R.)
 Received: 2 / 1957 Reviewed: 3 / 1957
 ABSTRACT: At first some relevant previous works are cited. On the occasion
 of a further development of these investigations of the ab-
 sorption of light in CdS crystals, at temperature of liquid
 helium, the authors discovered the following interesting phenom-
 ena: 1) The narrow bands in the range of strong absorption,
 which are located on the shortwave side of the line spectrum of
 the absorption of the CdS crystal, show a fine structure. In
 the case of some bands this structure is more distinct than in
 the case of others. 2) Adsorption bands of the CdS crystals
 also have different states of polarization. Some lines are very
 highly polarized so that they occur in the spectrum only in
 one component. Other lines are either not polarized at all or
 only very slightly. 3) The weak absorption lines of the CdS
 crystals are on the long wave side of the edge of the main ab-
 sorption; they are weaker and extremely sensitive to the condi-
 tions on which CdS crystals are produced and bred. The crystals,
 which were bred under different conditions, also have different
 spectra, especially with respect to the weak lines. Lines and

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PA - 2187

The Line Spectrum at the Edge of the Main Absorption and on the Structure of the Crystals of Sulphur-Cadmium (Russian).

weak bands with high absorption coefficients which were on the short wave side of the spectra of lines proved to have good stability. They obviously belong to the exciton levels. 4) The authors found an extraordinary variability of the line spectrum of absorption in the case of most of the crystals investigated. This applies not only to crystals produced by means of various methods but also for different points of one and the same crystal. Different crystal ranges also have different spectra. These and other phenomena indicate a very strong macroscopic inhomogeneity in the structure of various parts of a crystal and these ranges are sometimes distinctly separated from each other. Some phenomena resemble the STARK effect and indicate a strong inhomogeneity of the electric fields on the different parts of the crystals. The variety in the spectra of the CdS crystals, their inhomogeneity and variability may be due to several reasons of which, above all, the following are the most important: 1) The existence of a surplus of Cd- or S atoms in the CdS crystals. 2) The existence of "foreign" atoms in the CdS lattice. 3) Defects of all sorts in the crystal lattice. 4) Mechanical deformations of the lattice. 5) Surface

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PA - 2187

The Line Spectrum at the Edge of the Main Absorption and on the Structure of the Crystals of Sulphur-Cadmium (Russian).

phenomena and surface levels. The phenomena observed by the authors offer wide possibilities for spectroscopical examinations of the CdS crystals.

ASSOCIATION Leningrad Physical-Technical Institute of the Academy of
Science of the U.S.S.R.

PRESENTED BY:

SUBMITTED:

AVAILABLE: Library of Congress

Card 3/3

AUTHORS: Gross, Ye. F. and Kaplyanskiy, A. A.

TITLE: Absorption of Light in Crystals of Mercury Halides
(Pogloshcheniye sveta v kristallakh galogenidov rtuti)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Vol. XX1, #2, pp 220-224, 1957, USSR, Seriya fizicheskaya

ABSTRACT: Excited states of solids are manifested in absorption spectra of crystals by discrete structure at the long wavelength border of internal absorption. The role of the lattice in the existence and properties of exciton levels can be experimentally detected by two methods:

1. Studying and comparing absorption spectra of crystals of different chemical compounds possessing similar lattices;
2. Studying absorption spectra of crystals of different modifications of the same substance possessing polymorphism property; this method allows to detect the effect of crystal lattice on exciton levels "in the pure form."

Card 1/4

TITLE:

Absorption of Light in Crystals of Mercury Halides
(Pogloshcheniye sveta v kristallakh galogenidov rtuti)

The article describes results of studying absorption spectra in mercury halides HgJ_2 , HgJ and HgBr_2 .

The absorption spectrum of tetragonal modification of HgJ_2 has a complicated and diverse structure (lines, bands, continuous absorption steps extending in a wide spectrum region from 5,330 to 3,725 Å (at $T = 77.3^\circ \text{K}$). Basing on the Dykman and Pekar theory, the narrow lines in the absorption spectrum can be ascribed to the excitation of non-polarizing excitons in the HgJ_2 crystalline lattice. The broad bands can be ascribed to the formation of polarizing excitons connected with the higher excitation levels in the HgJ_2 crystal.

In the absorption spectra of the rhombic modification of HgJ_2 , no discrete structure was observed. The rhombic lattice of HgBr_2 is wholly isomorphic with the rhombic HgJ_2 lattice and their absorption spectra are identical. These results indicate the strong effect of lattice structure on crystal exciton levels.

Card 2/4

TITLE:

Adsorption of Light in Crystals of Mercury Halides
(Pogloshcheniye sveta v kristallakh galogenidov rtuti)

The difference between tetragonal and rhombic HgJ_2 modifications stems mainly from a difference in the geometry of lattices.

Adsorption spectra of HgJ were also studied. Structure was not detected in its monocrystals; in the thin polycrystal layers a broad band preceding continuous adsorption spectrum was discovered. The band center is situated at a wavelength of $4,240 \text{ \AA}$ (at $T = 77.3^\circ\text{K}$). It can be ascribed to the excitation of polarizing excitons in the HgJ lattice. This fact indicates the possibility of different effects of lattice structure on the polarizing and non-polarizing exciton levels.

Comparing these results with the results of photo-sensitivity of the two HgJ_2 modifications, the following correlation can be established: crystals of tetragonal HgJ_2 possessing linear exciton structure at the border of adsorption spectrum are highly photo-sensitive;

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TITLE: Adsorption of light in Crystals of Mercury Halides
(Pogloshcheniye sveta v kristallakh galogenidov rtuti)
crystals of rhombic HgJ_2 deprived of any structure at
the border of adsorption spectrum are non-photo-sensitive.
This correlation indicates the great role of excitons
in the phenomenon of internal photo-effect.
3 spectra are given. There are 18 references, of which
10 are Slavic (Russian).

INSTITUTION: Physico-Technical Institute of the USSR Academy of
Sciences

PRESENTED BY:

SUBMITTED: No date

AVAILABLE: At the Library of Congress

Card 4/4

GROSS, Ye F.

AUTHOR: GROSS, YE.F., RAZBIRIN, B.S., YAKOBSON, M.A. PA - 3573
 TITLE: Line Spectra of Fundamental Absorption Edge of the CdS Crystals.
 (Lineynchatyy spektr kraya osnovnogo pogloshcheniya kristallov
 sernistogo kadmiya, Russian)
 PERIODICAL: Zhurnal Tekhn. Fiz. 1957, Vol 27, Nr 5, pp 1149-1151 (U.S.S.R.)

ABSTRACT: The present paper gives a detailed description of the observations made at $T = 4.2^{\circ} \text{K}$. At this temperature the lines mentioned were particularly distinct. The monocrystals of CdS investigated were obtained in different manners:
 1.) According to FRERICH'S method (Phys.Rev. 72, 594, 1957).
 2.) By sublimation of pure CdS powder in a H_2S - and H_2 - atmosphere.
 In the case of all monocrystals investigated the optical axis O was in a plane of the crystal and was directioned according to the groove on the surface. It was found that a group of thin and weak lines on the edge of the real absorption domain, $\lambda \lambda 4889-4860 \text{ \AA}$, undergoes considerable changes with respect to intensity and breadth and number of lines on the occasion of transition from one crystal to another. The number of absorption lines differs according to the different crystals. In most samples their spectra were observed also in polarized light. Some of the thin lines at

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PA - 3573

Line Spectra of Fundamental Absorption of the CdS Crystals.

the edge of the absorption were highly polarized. The thin lines with long waves in the domain of $\lambda \lambda$ 4889-4865 Å are fully polarized. Those strips which are located on the short-wave side of the variable thin lines do not change their position considerably and seem to be stable. It turned out that not only the various crystals can differ from one another with respect to the spectrum, but that also various parts of one and the same crystal have different spectra. The great variability of the narrow lines on the edge of the absorption must still be interpreted and explained. (With 1 Table, 3 Illustrations, and 1 Slavic Reference).

ASSOCIATION: LFTI
PRESENTED BY:
SUBMITTED: 21.2.1957
AVAILABLE: Library of Congress

Card 2/2

57-4-36/36

AUTHOR: GROSSO, Ye. F., HAZBIRIN, B. S.

TITLE: Hydrogen-like Line Series in the Spectrum of the Cadmium-Sulphide Crystal on the Border of Basic Absorption. (Vodorodopodobnaya seriya liniy v spektre kristalla sul'fida kadmiya u kraya osnovnogo pogloshcheniya, Russian)

PERIODICAL: Zhurnal Tekhn. Fiz., 1957, Vol 27, Nr 6, pp 1398 - 1399 (U.S.S.R.)

ABSTRACT: A regularity in the distribution of the lines of the spectrum was found to exist where the thicker crystals have a group of broad stripes $\lambda\lambda$ 4860 - 4790 Å. In very thin crystals with a thickness of about 1μ , it was possible, because the stripes contracted and became narrow lines, to see a group of 4 thick absorption lines in the polarized light with an electric vector (which is located in a plane that is vertical to the optical crystal axis). It was found that the frequency of these lines satisfies the hydrogen-like dependence. The authors are of the opinion that this hydrogen-like series of thick lines in the absorption spectrum of the CdS shows that this series belongs to the excitons in the CdS crystal lattice. It is shown that the crystal in the plane which is vertical to the optical axis is "isotropic". It is assumed that in the case of excitation by a polarized light with an electric vector (which is located in a plane that is vertical to the optical crystal axis) the ex-

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57-6-36/36

Hydrogen-Like Line Series in the Spectrum of the Cadmium-
Sulphide Crystal on the Border of Basic Absorption.

citation spectrum of the excitons can be hydrogen-like, which fact
was also confirmed by experiment. (With 1 table and 3 Slavic
references)

ASSOCIATION: Not given

PRESENTED BY:

SUBMITTED: 20.5.1957

AVAILABLE Library of Congress

Card 2/2

AUTHORS: Gross, Ye.F., Zakharchenya, B.P. 57-9-3/40

TITLE: The Diamagnetic Zeeman Effect and the Exiton Structure in Cuprous Oxide Crystal (Diamagnitnyy effekt Zeyemana i struktura eksitona v kristalle zakisi medi)

PERIODICAL: Zhurnal Tekhn.Fiz., 1957, Vol.27, Nr 9, pp. 1940-1943 (USSR)

ABSTRACT In the case of a number of crystals narrow lines and absorption bands are observed at the edge of the basic absorption on the side of long waves. The investigation carried out here intends to prove that these narrow lines and bands are caused by excitons and not by an "admixture" center. This investigation is connected with the proof of the existence of the existence of exciton-quasiparticles, which is characteristic of the crystalline state. The author showed already in Zhurnal Tekhn.Fiz., 1956, Vol. 26, p 700 that the Zeeman effect is of a peculiar character the lines of the yellow Cu_2O -series $N=3,4,5,6$. This Zeeman effect can be used for the purpose of proving the aforementioned existence. Further investigations showed that this effect is much more complicated, namely: the observed splitting-up of the lines $n=3,4,5,6$ of the yellow exciton series is not caused by the ordinary linear Zeeman effect as was originally assumed by the author, but is connected with the diamagnetic quadratic Zeeman effect. It is shown that with one and the same n , but different azimuth quantum numbers l orbital magnetic quantum numbers m_l somewhat different diamagnetic displace-

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The Diamagnetic Zeeman Effect and the Exiton Structure in
Cuprous Oxide Crystal

57-9-3/40

ments take place, which, even if the ordinary linear Zeeman effect is lacking, leads to the splitting up of the energy terms in the case of the exciton. The investigation of the magnetic splitting up in the π - and σ -components of the lines of the yellow series in Cu_2O -crystal showed that with the lines of the series $n = 3, 4, 5, 6$ the diamagnetic quadratic Zeeman effect occurs, whereas the ordinary Zeeman effect is lacking. This proves that the narrow lines observed are caused by excitons and not by "admixture" centers. There are 15 Slavic references.

ASSOCIATION: Leningrad Physical-Technical Institute AN USSR (Leningradskiy fiziko-tekhnicheskiy institut AN SSSR)

SUBMITTED: April 15, 1957

AVAILABLE: Library of Congress.

Card 2/2

57-9-35/40

AUTHOR: Gross, Ye.P., Razbirin, B.S.

TITLE: The Spectrum of Edge Absorption in CdS Crystals and Its Relation with the Surface and Deformation of the Crystals
(Spektr krayevogo pogloshcheniya kristallov sul'fida kadmiya i yego svyaz's poverkhnost'yu i deformatsiyami kristallov)

PERIODICAL: Zhurnal Tekhn. Fiz., 1957, Vol. 27, Nr 9, pp. 2173 - 2176 (USSR)

ABSTRACT: CdS crystal of various thicknesses were investigated. It was possible to investigate the absorption spectrum of a crystal of one tenth micron thickness. It was found in this case that the self-absorption of light was so weak that it was possible to penetrate far into the violet part of the CdS absorption spectrum and to observe two new relatively broad washed out absorption stripes at the temperature of liquid helium ($T=4,2^{\circ} K$). One of them, has a breadth of 20 \AA in the neighborhood of about $\lambda = 4710 \text{ \AA}$, the other, with a breadth of 30 \AA in the neighborhood of $\lambda = 4660 \text{ \AA}$. Both are on the shortwave of the stripes previously detected by the authors (Zhurnal Tekhn. Fiz., 1957, p. 207 and DAN SSSR, 102, 485, 1955). Besides, the absorption spectrum of thick crystals obtained by the Frerikhs method was investigated. On the basis of experiments carried out it is

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57-9-35/40

The Spectrum of Edge Absorption in CdS Crystals and Its Relation with the Surface and Deformation of the Crystals

assumed that the narrow absorption lines in CdS crystals are not connected with the volume of the crystals but with its surface and are probably created during transition of the electrons under the influence of light into any levels, which are apparently located on the surface of the crystals. Both groups of experiments show that the narrow absorption lines are connected with the levels located on the surface of the crystals and are perhaps produced as a result of foreign substances existing on the surface of CdS crystals. It is shown that by the frequency of four stripes of nearly equal width which with one component of the electric vector $E \perp c$ (c - the optical crystal axis) satisfy the hydrogenlike relation. Observations carried out with polarized light make it possible to distinguish between two groups of CdS crystals which are distinguished from each other by the polarization of groups of narrow lines within the range of $\lambda\lambda 4889 - 4855 \text{ \AA}$. There are 4 figures, 1 table, and 5 Slavic references.

Card 2/3

57-9-35/40

The Spectrum of Edge Absorption in CdS Crystals and Its Relation with the Surface and Deformation of the Crystals

ASSOCIATION: Physical-Technical Institute, AN USSR, Leningrad
(Fiziko-tekhnicheskiy institut AN SSSR, Leningrad)

SUBMITTED: May 25, 1957

AVAILABLE: Library of Congress

Card 3/3